



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,342	12/30/2004	Ghorghe Iordanescu	015280-457100US	8951
<div>7590      11/27/2007 William Michael Hynes Townsend and Townsend and Crew Two Embarcadero Center 8th Floor San Francisco, CA 94111-3834</div>			<div>EXAMINER PARK, EDWARD</div>	
			<div>ART UNIT 2624</div>	<div>PAPER NUMBER</div>
			<div>MAIL DATE 11/27/2007</div>	<div>DELIVERY MODE PAPER</div>

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<p align="center"><b>Office Action Summary</b></p>	<p><b>Application No.</b></p> <p align="center">10/500,342</p>	<p><b>Applicant(s)</b></p> <p align="center">IORDANESCU ET AL.</p>	
	<p><b>Examiner</b></p> <p align="center">Edward Park</p>	<p><b>Art Unit</b></p> <p align="center">2624</p>	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/10/06</u> . | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Claim Objections*

1. Applicant is advised that should claims 9 and 10 be found allowable, claims 11 and 12 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### *Claim Objections - 37 CFR 1.75(a)*

2. The following is a quotation of 37 CFR 1.75(a):

The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

3. **Claims 1, 5** are objected to under 37 CFR 1.75(a), as failing to conform to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Regarding claim 1, the phrase, “isolating segments of vertex points (along) between planes normal”, is interpreted broadly as being any “vertex point between planes normal”. What is the scope of the word “(along)”? Which vertex points are being referenced and “along” what path or curve? The broadest interpretation will be utilized for examination purposes. Correction is required.

Regarding claim 5, the phrase, "smoothed version of the centerline", is interpreted broadly as being any centerline. What is the scope of the phrase "smoothed version"? Which constitutes a version that is smooth? The broadest interpretation will be utilized for examination purposes. Correction is required.

***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

5. **Claims 1-12** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 1-12 define an automated detection algorithm

embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed automated detection algorithm can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. **Claims 1-6, 9-12** are rejected under 35 U.S.C. 102(b) as being anticipated by Vining et al (US 5,920,319).

Regarding **claim 1**, Vining discloses an automated detection algorithm (see col. 2, lines 6-9 computer-implemented method and computer system) to compute the ring profile of colon like surfaces comprising the steps of:

providing an original image of a colon like surface disposed along a major axis in a scan having vertex points, each vertex point having a discrete point identifier and three dimensional position information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);

generating a thin version of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);

modeling the thin version of the colon like surface with an ordered set of 3-D points to produce a curve proximate to the major axis of the colon like surface (see col. 13, lines 47-62 central path algorithm uses an object's three-dimensional skeleton to find a path that lies along the center of its lumen);

isolating segments of vertex points (along) between planes normal to the curve proximate to the major axis of the colon from the thin version of the colon like surface (see figure 1, numeral 45; col. 10, lines 66-67; col. 11, lines 1-10 vertices on the wireframe model associated with abnormal structure are grouped into populations);

mapping the isolated segments of vertex points from the thin version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like

surface (see figure 1, numeral 49, 50; col. 12, lines 44-67; col. 13, lines 1-46 three-dimensional rendering of the wireframe model is displayed ... allowing the user to view the interior surface of the structure).

Regarding **claim 2**, Vining discloses decimating the vertex points of the provided original image (see figure 1, numeral 35 region of interest is segmented from the three-dimensional data volume which is equivalent to reducing the amount of vertex points).

Regarding **claim 3**, Vining discloses computing a centerline of the colon utilizing the ring profile of the colon like surface (see col. 13, lines 36-46 finite, intersection planes contain the central path of the wireframe model).

Regarding **claim 4**, Vining discloses measuring along the computed centerline of the colon like surface to determine positional information relative to the colon like surface (see col. 14, lines 12-22 distance transform for the three-dimensional region-grown object is then calculated).

Regarding **claim 5**, Vining discloses computing a smoothed version of the centerline of the colon to approximate centerlines (see col. 13, lines 36-46 finite, intersection planes contain the central path of the wireframe model) obtained by invasive colonoscopy (see col. 3, lines 52-67 three-dimensional renderings of three-dimensional structures generally having a lumen such as colons).

Regarding **claim 6**, Vining discloses utilizing the ring profile along a preselected length of the computed colon centerline (see col. 8, lines 39-57 predetermined distance) to determine the local colon volume and local colon distension along the preselected length of the colon (see

col. 2, lines 20-32 wireframe model analyzed to detect sections of the object having the selected characteristic such as abnormal wall structures).

Regarding **claim 9**, Vining discloses an automated detection algorithm (see col. 2, lines 6-9 computer-implemented method and computer system) to compute the ring profile of colon like surfaces comprising the steps of:

providing an original image of the colon like surfaces disposed along a major axis in a scan having the colon like surface identified by vertex points, each of vertex point having a discrete point identifier and three-dimensional positional information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);  
generating a thinned image of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing a neighbors averaging of the three-dimensional positional information for vertex points in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);  
randomly designating a first vertex modeling point at a vertex point along the thinned the colon image (figure 6, numeral 82; col. 12, lines 36-55);  
identifying and marking neighboring vertex points to the randomly selected first vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);  
designating a second vertex modeling point located at a predetermined distance from the first of vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);



sequentially repeating the identifying and marking, and designating steps to designate vertex modeling points from the randomly selected first vertex modeling point to an end of the colon (figure 6, numeral 88'');

connecting the designated vertex modeling points to produce a curve proximate to the major axis of the colon like surface (figure 9; col. 12, lines 1-35);

isolating groups of vertex points between planes normal to the curve from the thin image of the colon like surface (see figure 1, numeral 45; col. 10, lines 66-67; col. 11, lines 1-10 vertices on the wireframe model associated with abnormal structure are grouped into populations); and

mapping the isolated groups of a vertex points from the thinned image of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface (see figure 1, numeral 49, 50; col. 12, lines 44-67; col. 13, lines 1-46 three-dimensional rendering of the wireframe model is displayed ... allowing the user to view the interior surface of the structure).

Regarding **claim 10**, Vining discloses an automated detection algorithm (see col. 2, lines 6-9 computer-implemented method and computer system) to compute an approximate centerline profile of colon like surfaces comprising the steps of:

providing an original image of the colon like surfaces disposed along a major axis in a scan

having the colon like surface identified by vertex points, each of vertex point having a discrete point identifier and three-dimensional positional information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);

generating a thinned image of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing a neighbors averaging of

the three-dimensional positional information for vertex points in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);

randomly designating a first vertex modeling point at a vertex point along the thinned the colon image (figure 6, numeral 82; col. 12, lines 36-55);

identifying and marking neighboring vertex points to the randomly selected first vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

designating a second vertex modeling point located at a predetermined distance from the first of vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

sequentially repeating the identifying and marking, and designating steps to designate vertex modeling points from the randomly selected first vertex modeling point to an end of the colon (figure 6, numeral 88'');

connecting the designated vertex modeling points to produce a curve proximate to the major axis of the colon like surface (figure 9; col. 12, lines 1-35).

Regarding **claim 11**, the claim is rejected under the same conditions as claim 9.

Regarding **claim 12**, the claim is rejected under the same conditions as claim 10.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claim 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Vining et al (US 5,920,319) in view of Kaufman et al. (US 7,194,117 B2).

Regarding **claim 7**, Vining discloses the all elements as mentioned above in claim 1. Vining does not disclose mapping the vertices distance to the computed centerline; and building an image of vertices distances to centerline to map the colon.

Kaufman teaches mapping the vertices distance to the computed centerline; and building an image of vertices distances to centerline to map the colon (see figure 24, 25; col. 28, lines 20-39 each representative point is centered with respect to the colon wall).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining teaching to utilize a value closest to the desired value in terms of image resolution as suggested by Kaufman, so the user is able to visually refer to the volume/image data in regards to diagnosing abnormalities.

10. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Vining et al (US 5,920,319) with Kaufman et al. (US 7,194,117 B2), and further in view of Vining (US 5,782,762). Vining (US 5,782,762) will be referred to as Vining 2 from hereon.

Regarding **claim 8**, Vining discloses the all elements as mentioned above in claim 1. Vining does not disclose mapping the vertices distance to the computed centerline to obtain a mapped centerline view of the colon; rotating the mapped centerline view of the colon to spatially reorient the mapped centerline view of the colon; and reconstructing a spatially reoriented image of the colon from the rotated centerline view by expanding the vertices distances to map the colon.

Kaufman teaches mapping the vertices distance to the computed centerline to obtain a mapped centerline view of the colon (see figure 24, 25; col. 28, lines 20-39 each representative point is centered with respect to the colon wall).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining teaching to utilize a value closest to the desired value in terms of image resolution as suggested by Kaufman, so the user is able to visually refer to the volume/image data in regards to diagnosing abnormalities.

Vining 2 teaches rotating the mapped centerline view of the colon to spatially reorient the mapped centerline view of the colon (see col. 15, lines 1-9 object is rotated in space); and reconstructing a spatially reoriented image of the colon from the rotated centerline view by expanding the vertices distances to map the colon (see fig. 10, col. 13, lines 12-34).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining with Kaufman combination to rotate and reconstruct the image of the colon as suggested by Vining 2, to "enable the user to rapidly view a series of three-dimensional images of the lumen of the colon for purpose of detection of pathological conditions" (col. 3, lines 23-32).

### ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Park whose telephone number is (571) 270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

Application/Control Number:  
10/500,342  
Art Unit: 2624


Page 12

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Park  
Examiner  
Art Unit 2624

/Edward Park/



**VIKKRAM BALI**  
**PRIMARY EXAMINER**